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ABSTRACT

Most teachers and the public believe that children in kindergarten and the primary grades benefit from small classes because of children's need for individualized instruction and teacher attention. This report, part of a comprehensive policy study of early childhood education, presents a review of the research on the effect of class size on student outcomes, including achievement and adjustment to school. Topics covered include the following: (1) child development theory, (2) class size research, (3) a review of practices in South Carolina, Florida, and Indiana (4) a review of current Illinois statutes and practices, and (5) a summary of the findings in terms of policy implications for the Illinois State Board of Education. A review of the mandates for class size in the School Code of Illinois (1983) is given and tables provide comparisons between grades and types of programs. Data on kindergarten/primary class sizes of three selected states, South Carolina, Florida, and Indiana, is highlighted because of the different methods used in these states to achieve lower student/teacher ratios. A table in the appendix summarizes the recommended class sizes for kindergarten through third grade for all fifty states. In conclusion, this review shows that there is general agreement that at the primary grades smaller classses facilitate learning and that class size must be sufficiently small - at least below 20 - for significant benefits. (DST)

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CLASS SIZES FOR KINDERGARTEN AND PRIMARY GRADES: A REVIEW OF THE RESEARCH

ILLINOIS STATE BOARD OF EDUCATION

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Walter W. Naumer, Jr., Chairman
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PS 015297

Department of Planning, Research and Evaluation

January, 1985

FOREWORD

In response to a request from the Illinois State Board of Education, staff were directed to conduct a comprehensive policy study of early childhood education. This report on class size for kindergarten/primary students was prepared by Edith Helmich, M.A., and Leighton Wasem, Ed.D., Research and Statistics Section, Department for Planning, Research and Evaluation. The interpretations and conclusions expressed herein do not necessarily reflect the position or policy of the State Board of Education.

Ted Sanders
State Superintendent of Education

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Introduction

Early childhood education is the beginning of a continuum of formal education that has a minimum goal of high school graduation. In recent years, there has been considerable public and professional concern regarding the quality of education offered during the beginning years. The Illinois State Board of Education has, accordingly, undertaken a policy study of early childhood education and the factors which are associated with quality instruction.

The area of early childhood education encompasses preschool, kindergarten and the primary grades. This report focuses on one variable commonly believed to be a critical factor contributing to the quality of early childhood instruction -- class size.

Most teachers and the public believe that children in kindergarten and the primary grades benefit from small class sizes because of their need for individualized instruction and teacher attention. Young children are just beginning to acquire the skills required for academic study. The ability to work independently is gradually acquired as a result of the acquisition of reading and writing skills and increased social and emotional maturity. The developmental stage of kindergarten and primary children is characterized by the need to learn through activity and experiential or concrete learning to a greater extent than for older children whose cognitive abilities involve more abstraction.

Teachers have lauded the benefits of smaller classes, while administrators have emphasized the higher costs associated with reductions in class size (Glass and Smith, 1979). Teachers feel it is more difficult to work with large numbers of students, that the range of possible teaching strategies is restricted and that individual attention is more difficult to provide (Leitner and Tracy, 1984). Teachers of kindergarten and primary grades indicate that they must adapt instruction to children who still have short attention spans and are easily distracted. Young children need to move and exercise frequently in contrast to older children who can tolerate sitting at a desk for most of the school day. Immature or "childish" behavior (i.e., emotional outbursts or distractibility) is not a deviation among young children, but rather is to be expected during these years. Consequently the teacher is frequently required to act as a surrogate mother, counselor or arbitrator in addition to fulfilling the classic role of a teacher.

These observations of typical characteristics of kindergarten- and primary-age children form the basis for the assumption that smaller classes enable teachers to provide the individual attention that young children need for optimum learning to occur. Adequate teacher accommodation to these characteristics is directly affected by the number of children to whom a teacher must respond, and instructional time is directly affected by the extent to which a teacher is able to meet these related needs (Phyfe-Perkins, 1981). Child development theory and research supports this conventional wisdom.

The question addressed in this report, however, is to determine whether there is an optimum class size for these grades. What is a "smaller" class in terms of the actual number of students? Further, should a numerical limit be established by the state or local district for the class size of kindergarten and primary grades? This report will present a review of the research on the effect of class size on student outcomes, including achievement and adjustment to school. A brief review of practices in other selected states and a review of current Illinois statutes and practices follow the review of the literature. Finally, a summary of the findings is presented in terms of policy implications for the State Board of Education.

Review of the Literature

The review of the literature addresses two aspects: child growth and development and class size research.

Child Growth and Development

Class-size research is most relevant when reviewed with consideration of the unique characteristics of the population in question. Although school-age children and the programs designed for their education have many commonalities, the physiological, psychological and sociological maturity levels of kindergarten and primary children are substantially different from those of older children. These differences require that the program structure, teaching techniques, materials and physical environment be adapted for the appropriate developmental level of children.

During the beginning school years, students have not yet acquired the common experience in school activities and procedures acquired by older children. Scott-Jones (1984) states that family characteristics are more influential for young children since the children are only beginning to form the close relationships with peers and other adults that will gradually lessen their dependence on parents. The broad variety of cultural, ethnic and socioeconomic factors which influence the preschool child's development are still dominant when children enter school.

Scarr and Weinberg (1978) found that the home environment was related to children's school performance. However, Bronfenbrenner (1974), Bloom (1964), Weikart (1982) and numerous other researchers found that the detrimental effects on cognitive development and other educational outcomes resulting from deprived or income-poor home environments were substantially modified if children and/or parents were enrolled in effective preschool programs. In Illinois, approximately 50% of kindergarten children have experienced one or more years of preschool group instructional experience. In addition to the possible benefit in terms of increased readiness for academic learning reported by Bloom and Bronfenbrenner, children with group instructional experience require a shorter transition or adaptation time during the first year away from the home environment (i.e., kindergarten) than do those who have been cared for at home (Naron, 1981).

In addition to the differences among young children in terms of home environments and preschool experiences, the physical, social, psychological and cognitive characteristics of young children are unique in contrast to

older children. Several theorists and writers in child development document what parents know through association with their children and what teachers of young children explain when describing the differences in instructional techniques for young children compared to older children. Summaries of those theorists and writers follow.

Jean Piaget's (Almy, Chittenden and Miller, 1966) classic description of the child at the pre-operational stage of development typical of kindergarten children (four- and five-year-olds) states that the child:

- has difficulty distinguishing fact from fantasy;
- attributes human characteristics to plants, animals and objects;
- is egocentric - unable to view the situation from another's perspective;
- is aware of present, past and future, but does not really understand the concepts of time and space;
- is only beginning to be able to play games in which it is necessary to follow pre-established rules; and
- will probably pay attention to only one feature of an object, such as its color, and ignore other features, such as size or shape.

Piaget emphasized the importance of learning through activity and believed that direct experience is the avenue to knowledge and logical ability for young children. He emphasized the importance of social interaction with small groups of children to foster cognitive development and to correct the egocentric views of the young child. Piaget believed that the maturation level of the child should match the experiences provided to the child.

In general, child development theory indicates that in order to promote children's social development and personal adjustment, the preschool and elementary curriculum should provide children opportunities to interact: 1) with peers in pairs and small groups, 2) with many peers and 3) in many different situations and activities (Johnson, 1981; Carthledge and Milburn, 1980; Youniss, 1978).

Developmental Characteristics of Children and Youth, a chart published by The Association for Supervision and Curriculum Development (1975), described the characteristics of five- to seven-year-olds in numerous areas. Selected characteristics were as follows. Socially, children face many new challenges, tend to select two or three best friends, quarrel frequently, and need teacher affection and approval. Emotionally, children express feelings openly (often in extreme form), need frequent reassurance, and are beginning to accept rules, but do not understand the principles behind them. Physically, girls are more advanced than boys in development; small muscle and eye-hand coordination are still developing; and large muscle coordination is sufficient for game playing and handling tools and materials. Thinking skills are developing and attention span increases

dramatically during the five to seven period; memory skills are best for concrete sequence; and there is improved differentiation between fantasy and reality. Language skills are developing although vocabulary comprehension is mostly concrete and understanding of language is greater than the ability to use language.

A series of articles written for the Office of the Superintendent of Public Instruction (Illinois) described the typical behavior characteristics of five-, six- and seven-year-old children. Behaviors were described as progressing from the eager-to-please, parent-dependent, enthusiastic five- year-old to the overt approval-seeking, imaginative, physically active (but easily fatigued) six-year-old; and finally to the more achievement conscious, talkative seven year old who displays interest in fine muscle control through a love of drawing and writing letters of the alphabet.

David Eskind has stated that young children's mental abilities are much more integrated with their emotions than those of older children, so that when young children are distressed, emotion dominates intellectual as well as emotional orientation. Therefore, teachers of young children must attend to the emotional needs of students to a much greater extent than teachers of older children. Resolving disputes and providing reassurance are prerequisites to instructional activities.

Cohen (1966) states that young children need emotional support, attention, affection and approval from their teachers to facilitate learning and school adjustment. This view was reiterated in a report from the American Federation of Teachers (1973) that recommended increased personal attention in the classroom for young children. The logical assumption that child/teacher contacts are more frequent in smaller classes than larger ones was documented in a study by Varner (1968). Fewer students mean that a teacher has more time to attend to individual students and, consequently, that disruptive occurrences are less frequent.

Class Size Research

Research has addressed, in general, the wide range of ages and grade levels represented during the compulsory school years. Few studies have focused on the young student at the kindergarten/primary level. Nevertheless, class size research for all ages represents the best available data on which to base conclusions regarding the effects of class size on learning for young children, particularly when synthesized with findings in the related areas of child growth and development.

While there is a long history of research on class size, the implications of such research have been unclear. Class-size research has variously been interpreted as supporting smaller classes, larger classes, and nothing except the need for more research. There seem to be three main reasons for the confusion among both educators and researchers concerning the effects of class size:

(1) Reviews of the research evidence have been overly selective and insufficiently quantitative (Glass and Smith, 1978).

(2) There has been no consistency among researchers in the definition of and distinction between "small" and "large" classes. (Frequently, "small" and "large" classes have been defined only as being below or above the average-size class. Such a definition has usually resulted in narrow differences between "small" and "larger" classes since the distribution of most class-sizes is close to the average class size.)

(3) Research has generally not adequately controlled for the presence of other important variables pertaining to the learner (e.g., ability and motivation), teacher, and instructional process (Educational Research Service, 1978). When uncontrolled, the effects of these extraneous variables may have overshadowed and "washed out" the effects of class size.

In an attempt to clarify the class size issue and draw conclusions from the plentiful but inconclusive research concerning class size, two major research reviews were published in 1978 and a third review was published in 1979. The Educational Research Service, Inc. conducted a classic review wherein the findings of multiple studies were analyzed for commonalities and similar conclusions. The remaining two reviews by G. V. Glass and M. L. Smith used a different methodology, meta-analysis. Pioneered by Glass, meta-analysis is a pooling of data from a large number of studies through complex regression statistics in order to obtain new insights.

The three reviews have many similar findings and conclusions, but the strong conclusions in support of very small class sizes reported by Glass and Smith have created considerable controversy and prompted a number of replications and reanalyses of their two studies.

The first major review of the research concerning class size was published in 1978 by the Educational Research Service, Inc. (ERS). Approximately 150 studies were included in the review. The report identified a concern regarding the definitions used for class size and differentiation between student-teacher ratios, student-staff ratios and student-adult ratios. The type of ratio used varied among research studies and may have created erroneous conclusions when studies were compared in the past. ERS, accordingly, presented each study as having unique findings, rather than attempting to synthesize results. The conclusions reached were that the research provided no clearcut guidelines for an "optimum" class size covering all types of students at all grade levels. Since students at different levels of personal and academic development required different learning conditions, educators were advised to address the question: Which type of students might benefit the most from smaller classes?

The major generalizations from the studies follow.

1. Small classes in the primary grades are important for reading and mathematics achievement.

2. Primary students taught for two or more years in small classes are more likely to show increased achievement.

3. Pupils with lower academic ability tend to benefit more from small classes than do students with average ability.

4. Economically and/or socially disadvantaged students tend to benefit from smaller classes.

5. Smaller classes appear to have a positive effect on elementary student behavior.

6. Smaller class size has little benefit unless teachers use appropriate instructional methods and procedures, such as small-group and individualized instruction.

7. Most teachers perceive large classes as negatively influencing teacher morale and job satisfaction, as well as student academic performance and social and personal development.

8. The public perceives small classes as being of major importance to student achievement and progress.

9. Class size is a major determinant of school system budgets.

10. Efficient class sizes are a product of many variables including: subject area, nature and number of students in the classroom, nature of learning objectives, availability of materials and facilities, instructional methods and procedures used, skills and temperament of the teacher and support staff, and budgetary constraints.

A second review of class size research by Glass and Smith was also published in 1978. Using complex methods of regression analysis, 80 studies (700 comparisons) were integrated into a single statistically derived curve showing the relationship between class size and student achievement. Final analysis was made on 100 selected comparisons. The major conclusion was that as class size decreased, achievement increased. Major benefits were shown when class size was less than 20 students. More specifically, the difference in achievement between individual (one student) instruction and a class of 40 students was more than one-half standard deviation; individual instruction compared to instruction for a class of 25 students also showed an achievement difference of one-half standard deviation. Classes of 10 students compared to classes of 25 or 40 students showed a difference in achievement of approximately one-quarter standard deviation.

Figure 1 depicts the increase in achievement as class size decreased. As shown, Glass and Smith found no achievement differences in classes with from 20 to 40 students.

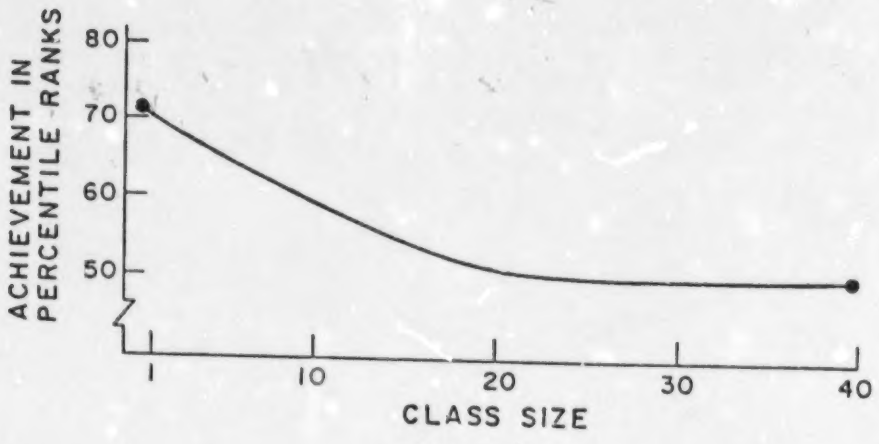

Figure 1. Consistent regression line for achievement (percentile ranks) onto class-size (all data). (Glass and Smith, 1978)

When students were grouped into elementary and secondary classes, the class size and achievement effect was consistently stronger in the secondary classrooms than in the elementary classrooms, until the class size reached about 30. (See Figure 2).

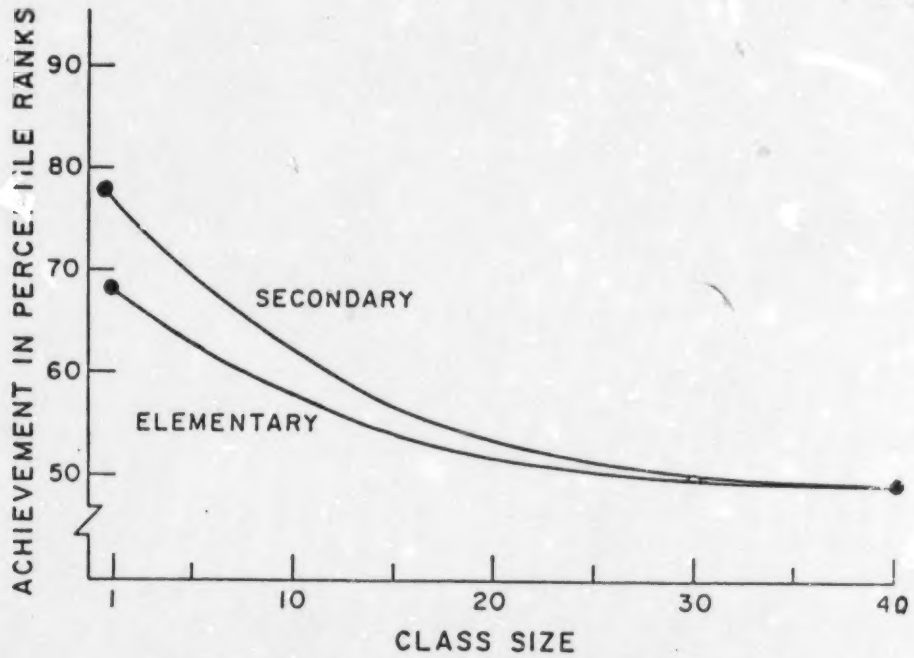

Figure 2. Consistent Regression Lines for the Regression of Achievement (expressed in Percentile Ranks) onto Class-size for Elementary and Secondary Grades. (Glass and Smith, 1978)

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Glass and Smith concluded, however, that the class size studies did not provide a simple answer to a complex question--the ideal class size.

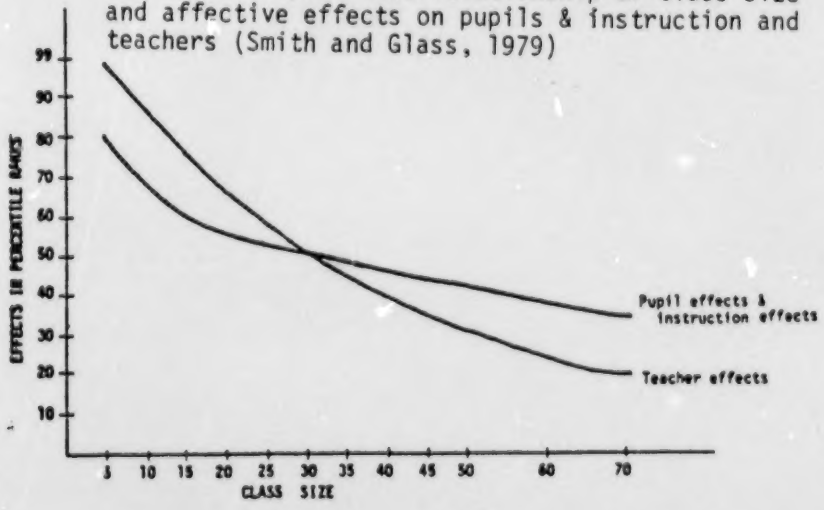
A third review of class-size research was published by Smith and Glass in 1979. Using the meta-analysis procedure, this study examined the relationship between class size and measures of outcomes such as student attitudes and behavior, classroom process and learning environment, and teacher satisfaction. The authors reported that statistical integration of the existing research indicated that reduction in class size was associated with higher quality schooling and more positive attitudes. The findings revealed that small class size was associated with higher quality classroom environments, better student attitudes, and greater teacher satisfaction. Findings also indicated that class-size effects were related to pupil age, with effects most noticeable for children 12 years and under and least apparent for pupils 18 or over.

On all measures, reduction in class size was associated with higher quality schooling and more positive attitudes. Smaller classes provided more opportunities to adapt learning programs to the needs of individuals; students had more interest in learning. Teachers in smaller classes reportedly had better morale, liked their students better, had time to plan and diversify, and were more satisfied with their performance.

Stating that class size, per se, did not directly affect achievement and that class size was not the sole determinant of achievement, Smith and Glass believed that achievement was at best an indirect effect, several steps removed from class size. Rather, the environment and teaching processes afforded by decreased class size have the potential to produce higher achievement in students. To the extent that decreased class size is related to a favorable affective climate, they believed that class size could be defended as an important condition for increasing student achievement.

As shown in Figure 3, smaller class sizes had a greater effect on teachers than on students. The positive affective effects (i.e., attitudes and behavior) for both teachers and students that occurred as class size was decreased were believed to improve the instructional environment in a way that facilitated higher achievement for students.

Figure 3. Graph of the relationship of class size and affective effects on pupils & instruction and teachers (Smith and Glass, 1979)



Glass, Cohen, Smith and Filby (1979) in another article supporting the meta-analysis studies hypothesized that other possible outcomes of reducing class size could be teacher satisfaction, opportunities for individualized instruction, peer teaching, student discussion, curriculum enrichment and a lower rate of student failure. Their recommendations for reducing class size included: (1) employing reading specialists, part-time assistant teachers, paraprofessionals and noninstructional aides; (2) scheduling and grouping within a classroom; and (3) providing selective small classes for special needs students.

The complex meta-analysis methods, combined with the innovative nature of the meta-analysis process, generated questions and challenges to Glass and Smith's conclusions.

Cahen and Filby (1979) conceded that larger classes permit less relaxed interaction with individual students, and with fewer students to attend to, a teacher should be able to improve the quality or quantity of instruction. They challenged Glass and Smith's findings because the curve showed the relationship of class size and achievement without any attempt to see how this relationship was conditioned by the quality of instruction or other variables. They felt that reduction in class size must be accompanied by the support and education of teachers to enable them to realize the potential of a smaller class.

The Educational Research Service, Inc. (1980), criticized the meta-analysis process for concluding that smaller classes are always better and that classes must be very small to be much better. ERS maintained that few benefits can be expected from smaller class sizes if teachers failed to individualize instruction and continued to use the teaching techniques that they used in larger classes. Further, ERS voiced concern that the meta-analysis procedure obscured and obliterated many helpful findings in class-size research that pertained to students of varying ability, various subject areas and various grade levels.

Hedges and Stock (1983) reported their reanalysis of the Glass and Smith study and found that rigorously justified statistical methods did not greatly affect the results: smaller classes lead to higher expected achievement than larger classes. However, they also concluded that substantial sources of systematic variation remain to be explained. This meant that the range of achievement did not consistently follow class size, which suggests the influence of other variables relating to achievement.

Leitner and Tracy (1984) also reported their results of a reanalysis of the Glass and Smith Study on class size. After eliminating the very small, atypical class sizes (one to five students), they found that the mean effect size was reduced to almost half of the effect size reported by Glass and Smith. Their conclusion was that the increased achievement that Glass and Smith attributed to small classes may be substantially less than claimed after deleting the effect sizes based on atypically small classes.

Despite the controversy, several findings from these three reviews remain unchallenged. The first is that smaller classes provide more opportunities for individualized instruction. Second, younger children appear to benefit from smaller classes. Third, other variables are a component of the

effectiveness which is attributed to class size effects on student achievement and school adjustment. These factors are generally thought to be associated with the emotional climate of the classroom, instructional techniques, student characteristics, etc. Despite these indications that young students would benefit from small class sizes, the "magic number" of students that constitute the optimum class size cannot be identified on the basis of available research. Given the variables, it is unlikely that one number can satisfy all the relevant conditions.

Kindergarten/Primary Class Sizes in Illinois

The School Code of Illinois (1983) does not mandate specific class sizes for public school children. Student/teacher ratios are left to the discretion of local school districts. There are, however, statutes which speak to class sizes in an indirect manner.

> Section 10-22.18 - Kindergartens. This statute addresses the establishment of kindergartens by petition and requires a minimum of 15 students in annual average daily attendance.
>
> Article 35. Buildings-School Building Commission
> Section 35-9. Classrooms and Facilities.
>
> All classrooms and related facilities to be provided hereunder shall conform to the minimum requirements of the State Board of Education specified under Section 2-3.12 of this Act. There shall be 1 classroom for each 32 pupils or major fraction thereof in average daily attendance in grades K through 6, and 1 classroom for each 28 pupils or major fraction thereof in average daily attendance in grades 7 through 9, and one classroom for each 25 pupils or major fraction thereof in average daily attendance in grades 10 through 12. . . .

Although related to class size, these statutes do not address instructional or program issues and may be easily misinterpreted. The implication that larger classroom student capacities are more appropriate for K-6 students than for students in grades 7-12 is present, even though the need for more classroom space to accommodate instructional activities for younger students is commonly recognized by educators familiar with the instructional techniques used with kindergarten and primary-age children. Further, since a classroom is typically taught by one teacher, the implied student/teacher ratio is misleading since kindergarten and primary teachers may be assisted by an instructional aide when class sizes approach the 35-student capacity referenced in the statutes.

Data on class sizes in Illinois for the K-12 grades are not collected. However, estimates of class size (student/teacher ratio) were made. Student enrollments by grade levels were compared to the number of teachers by grade levels. The class sizes reported in the following table should be considered estimates and are subject to error. Class-size data for kindergartens are not available because of difficulties with data reported on a variety of program designs with various staffing patterns, i.e., full-day, every day; full-day, alternate days; and half-day, every day.

The median estimated class sizes in Illinois schools for grades one through three ranged from 23 to 24 students.

Table 1: Estimated Student/Teacher Ratio for Grades One, Two and Three

Grade Level	Median No. of Students/Teacher
Grade One	23.6/1
Grade Two	23.3/1
Grade Three	24.0/1

Source: Illinois State Board of Education:
Teacher Service Record, ISBE 87-05 (5/83), 1983-84;
1983-84 Public District Application for Recognition and Fall Enrollment/Housing Report, ISBE 87-02 (6/83).

The number of instructional aides assigned to assist with kindergarten and primary grades is not known. The number of aides is reported by school, rather than grade-level assignment.

Teacher concern with class size is documented by the number and types of teacher contract provisions on class size found in Illinois districts. In 1983-84, 158 districts or 32% of all negotiated contracts had a clause or section on class size. Further, 47 or 10% of all negotiated contracts had a clause on class/teacher ratios. These two types of clauses are not mutually exclusive, and both are directly related to the number of students assigned to individual teachers.

Also to be considered are the student/teacher ratios contained in the Illinois State Board of Education Resource Cost Model (RCM), a proposed formula for the distribution of state funds to local school districts. As shown in the Table 2, RCM-proposed class-size ranges are similar to current estimates of median class sizes for elementary children.

Table 2: Class Size as Identified in the Resource Cost Model Instructional Programs

Program Description	Class Size or Caseload			FTE Personnel Per Visit		
	Target	Max.	Min.	Tchrs.	Aides	Other Profs.
Self-Contained Kindergarten	22	28	16	.5	0	0
Self-Contained Grades	23	28	16	1.0	0	0

Source: Illinois State Board of Education

Kindergarten/Primary Class Sizes in Other States

Interest in class size for kindergarten and primary grades across the nation is reflected by programs in three selected states: South Carolina, Florida, and Indiana. Each of these states uses different methods to obtain small classes for children during the beginning school years, with the belief that young children receive a better educational experience with lower student/teacher ratios. The examples represented by these three states are not exhaustive and are included in this report to suggest the flexibility possible for state policies.

South Carolina

While not specified in statute, South Carolina maintains a clear and precise kindergarten class size limit (Trantham, 1984). The Department of Education's Defined Minimum Programs for School Districts states that class size in grades K through 3 shall not exceed 30 pupils to 1 certificated teacher. In addition, each teacher of a kindergarten unit shall have a full-time teacher aide. The net result in combining these two rules is a maximum pupil/adult class ratio of 15 to 1 for kindergarten. These mandatory rules regarding kindergarten class size provide no financial incentive for compliance and have been in effect for more than a decade.

Further, the South Carolina state aid formula allocates a greater proportion of dollars for primary grade students (weight = 1.3) than for pupils in grades 4 through 8 (weight = 1.0). This is the reverse of the Illinois state aid formula where pupils in the primary grades (weight = 1.0) are given a slightly smaller proportion of dollars than pupils in grades 7 and 8 (weight = 1.05). Since public school kindergarten programs in both South Carolina and Illinois are typically half-day in duration, the adjusted kindergarten state aid rates are .65 and .50, respectively. Consequently, as a proportion of the total available state aid, primary education receives a higher financial priority in South Carolina than in Illinois (Ford, 1984).

Florida

Florida legislature enacted a comprehensive Primary Education Program which became effective in 1980 (Fahs, 1984). This program required districts to prepare and submit a primary education plan which included a specified annual reduction in the district average pupil/teacher ratio for kindergarten over a three-year period (1980, 1981, 1982), using 1979 as the base year. There is no statewide maximum kindergarten class size as school districts individually and voluntarily determine their amount of annual reductions in the pupil/teacher ratio by choosing one of the two following methods:

1) Reducing the pupil (FTE) to basic classroom/teacher ratio; or

2) Reducing the pupil (FTE) to classroom/adult ratio where adults include the basic classroom teacher, primary specialist, and teacher aide.

The primary specialist functions as a master teacher and works with pupils, teachers and parents.

Similar to South Carolina and contrary to Illinois, the Florida state aid formula allocates a greater proportion of dollars for primary grade students (weight = 1.234) than for pupils in grades 4 through 9 (weight = 1.0). Since most public school kindergartens in Florida are full-day every day, the state aid ratio per kindergarten pupil is 1.23 vs. .50 in Illinois. In addition, categorical dollars above and beyond the state aid allocation have been provided by the state legislature to fund the Primary Education Program. The total categorical funding for the comprehensive Primary Education Program has increased from about 23 million dollars in 1980 to more than 85 million dollars in 1985 (Per year, 1984).

Indiana

The Indiana Department of Public Instruction recently implemented pilot projects (Project PRIMETIME, 1983) to determine the effects of class size reduction at the primary grade levels. The purpose of the ongoing PRIMETIME pilot projects was to upgrade the quality of early school experiences by reducing pupil/teacher ratio. Twenty-four classes with 14 or fewer pupils were initiated in 1981-82 in 9 sites scattered geographically throughout Indiana and including city, town, and rural schools. These experimental classes were compared with control classes which were similar, located in the same school district but differed in size. The control classes averaged 23 students. In addition to a reduction in class size, the State educational agency provided services to the PRIMETIME sites, including assistance in individualizing instruction, providing inservice training, assessing for instructional purposes, and providing information on parenting skills to parents of participating students.

In 1982-83, 19 of the 24 classes had enrollments which permitted continued comparisons. A two-year comparison of the PRIMETIME Project students with students in similar kindergarten classes in the same districts on reading and mathematics achievement is shown in Table 3 (Project PRIMETIME, 1983). While differences between the two groups were not as great in mathematics as reading, PRIMETIME students generally showed greater improvement than did control students. The Indiana State Department of Public Instruction (Project PRIMETIME, 1983) also noted that discipline problems were appreciably lower in the smaller size classes. While the PRIMETIME project has continued during 1983-84, the results for the 1983-84 school year are not yet available.

Table 3: Project PRIMETIME: A Two-Year Comparison of Percent Who Improved after Two Semesters

		Reading (Verbal)		Math (Quantitative)	
		Project Students	Control Students	Project Students	Control Students
KINDERGARTEN (3 sites)	1981-82	48%	20%**	65%	35%**
	1982-83	63%	53%	54%	56%
GRADE ONE (3 sites)	1981-82	70%	32%**	67%	61%
	1982-83	45%	39%	58%	44%*
GRADE TWO (3 sites)	1981-82	51%	46%	94%	75%**
	1982-83	67%	49%**	44%	44%
Total K-2 (9 sites)	1981-82	54%	28%**	72%	50%**
	1982-83	61%	47%**	53%	49%
TOTAL TESTED	1981-82	231	338	166	346
	1982-83	223	315	190	288

Note: - "Improved" means students exceeded normal growth between pretests and post-tests given after two semesters.

* - Difference is statistically significant at $p < .05$ using a Chi-square test.

** - Difference is statistically significant at $p < .01$ using a Chi-square test.

Based upon the positive reported results of the PRIMETIME project, the Indiana legislature recently enacted a plan to encourage and reward public schools that voluntarily reduce the class size to 18 pupils in the primary grades (Magers, 1984). School districts that participate will receive $18,000 for each newly employed teacher, and $6,000 for each newly employed aide required to reduce the class size to 18 or below. Such payments continue during future years as long as the employment of the teacher(s) and aide(s) are necessary to maintain a class size of 18 or lower. Districts that already have class sizes at 18 pupils or below also receive funding ($3,600) for each classroom. Aides are credited as being equivalent to .3 teacher so that classes with a teacher and an aide qualify for funding with 24 students.

The newly enacted Indiana plan for reducing class size is voluntary and provides a direct financial incentive for school district participation. The Indiana state aid formula provides the same proportional funding (weight of 1) for pupils in grades K through 12 and a rate of .5 for kindergarten children (Bric', 1984).

Both Florida and Indiana have state policies that allow for considerable local-district discretion in setting class sizes for kindergarten and the primary grades, while South Carolina mandates precise class-size limits and staffing requirements. All three states provide financial support or incentives for the reduction of class sizes to specified levels. However, among these three states with active class-size reduction policies, there is no agreement on the ideal class size.

Nationally, the interest and concern regarding kindergarten and primary-grade class size has resulted in a variety of state policies regarding class size: approximately 38% of states leave the determination of class size to district discretion; approximately 33% mandate specific maximum kindergarten class sizes; and the remaining 22% recommend appropriate class sizes for these age levels. Of those states mandating maximum class sizes, the median is 25 students. However, the range extends from 10 to 40 students, indicating that there is no agreement among the states on the optimal number of students or class size for the kindergarten level. A chart reporting data collected from the states is contained in Appendix A.

Summary and Conclusions

A review of the research showed that there is general agreement that at the primary grades smaller classes facilitate learning and have other beneficial effects for the learner, teacher, and classroom atmosphere. There was also general agreement that class size must be sufficiently small -- at least below 20 -- for significant benefits. Reducing class size from 35 to 25 (a typical reduction) reportedly will have only minimal benefits, if any, and would not seem to justify the cost of such reductions.

Research findings and child development theories regarding the physiological, psychological and sociological characteristics of kindergarten/primary students support the need for individual teacher attention to a greater extent than is required for older children. Young children represent maturation levels characterized by emotional dependency, developing cognitive/reasoning ability, shorter attention span and rudimentary social skill. Adequate teacher accommodation to these characteristics is directly affected by the number of children to whom a teacher must respond and engage, and instructional time is directly affected by the extent to which a teacher is able to meet these related needs.

Smaller class sizes facilitate appropriate instructional strategies, i.e., individual and small-group instruction. Numerous studies have reported that despite substantial reductions in class size, pupil benefits may be minimal or nonexistent if teachers continue to use instructional methods appropriate for large classes (such as lecture).

The research reports that important variables such as teacher quality, type of program, adequacy of facilities and materials, socioeconomic and family characteristics, prior experiences of students, and the presence or absence of instructional aides to assist in the classroom are ignored in studies

regarding class size. There was a pervasive tendency to attribute benefits to class size reduction without considering these other important variables. Even so, the research shows that young children are more appropriately and effectively served in classes with fewer students than is the case for older, more mature students.

The optimum class size, however, cannot be identified on the basis of available research. It is unlikely, given the differences in children's needs, teacher characteristics and environmental conditions, that an appropriate class size can be determined at a distance from the specific classroom.

Although precise data are not available, estimates of the median class sizes for the primary grades in Illinois schools are 23-24 students, which is not far from the general research recommendations of 20 or fewer students. However, the variation in classrooms may be great. Since the median represents an average student/teacher ratio, there would appear to be a need for reducing class size in some classrooms where the ratio is inappropriately high.

Further, reduction of class size without other program modifications does not appear to hold reasonable promise of increased benefits for kindergarten and primary grade students. Effective programs for young children seem to be dependent on a process of determining the appropriate number of students according to the characteristics of the teacher and students, the methodology used for instruction, the physical environment and the availability of related services such as instructional aides. Such a process seems likely to result in appropriately sized classes for younger children and, further, seems to be more in keeping with accepted principles of educational theory than the establishment of arbitrary class-size limits.

In sum, smaller class size in kindergarten and primary grades is relevant to student achievement and other educationally desirable outcomes. However, the determination of effective class size can only be made with precision with consideration of the many other factors which may impact on the specific class in question.

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APPENDIX A

SUMMARY OF RECOMMENDED/MANDATED CLASS SIZES FOR K-3

State	Recommended Max. Class Size		Mandated Max. Class Size		Recommended Max. w/Aide		Mandated Max. w/Aide		Local Dist. Discretion
	K	1-3	K	1-3	K	1-3	K	1-3	K-3
Alabama	25								
Alaska									X
Arizona									X
Arkansas	25	30							
California			33	32					
Colorado	15				20				
Connecticut									X
Delaware	19	19							
Florida									X
Georgia									X
Hawaii			26	26					
Idaho			40	23					
Indiana			18			18+			
Iowa									X
Kansas									X
Kentucky			29	27					
Louisiana			29	29					
Maine	20	30							
Maryland									X
Massachsetts	18	25							
Michigan									X
Minnesota			30	30					
Mississippi									X
Missouri	20								
Montana	20	20							
Nebraska									X
Nevada									X
New Hampshire	20	20							
New Jersey			25	25			29	29	
New Mexico			20	26					
New York									X
North Carolina							29		
North Dakota			25	25					
Oklahoma			25						
Ohio			25	25					
Oregon	24	24			24+				
Pennsylvania									X
(Rhode Island)									(not included)
South Carolina							30		
South Dakota									X
Tennessee			25						
Texas			23 (effective in 1985)						
Utah									X
Vermont				20				25	
Virginia			25				30		
Washington			(K-3 class size cannot be larger than grades 4-12)						
West Virginia			10				20		
Wisconsin	20-22	20-22							
Wyoming									X

Source: Illinois State Board of Education, Early Childhood Education Policy Study, Survey of the States.